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Plant and Animal Adaptations [4th grade]

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Education Department

Understanding by Design Curriculum Units

Trinity University

Year 2006

Plant and Animal Adaptations

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Trinity University,

Understanding by Design: Unit Cover Page

Unit Title: Plant and Animal Adaptations

Grade Level: 4th Grade

Subject/Topic Area(s): Science

Designed By: Jennifer Mahler

Time Frame: About 4 weeks: 30 minutes a day

School District: Devine Independent School District

School: Devine Intermediate

School Address and Phone:

Devine Intermediate
900 Atkins
Devine, TX 78016
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Brief Summary of Unit (Including curricular context and unit goals)

This unit will help students recognize the many ways that plants and animals adapt to their environments. Students will explore how an organism's environment affects the way the organism looks, as well as identify challenges that organisms face both past and present.

Students will also compare endangered or extinct animals with animals that are successful. In doing this, they will attempt to discern why certain animals thrive while others do not.

In the performance assessments, students will be asked to create an animal with adaptations for a given environment and to adapt an extinct or endangered plant to its environment to ensure survival. Both of these tasks will require students to critically think about the different types of environments that exist, the different types of adaptations that can be useful, and to put those concepts together to create a new, successful organism.

Unit: Plant and Animal Adaptations

Grade: 4th grade Science

Stage 1: Desired Results

Understandings

Students will understand that...

- Over time, a living organism adapts to its environment to better meet its basic needs; thus, ensuring survival

Essential Questions

- Why do some organisms become endangered or extinct and others do not?
- How does a particular environment affect how a species looks or acts?

Knowledge & Skill

- 4.8 The student knows that adaptations may increase the survival of members of a species.
- A) identify characteristics that allow members within a species to survive and reproduce
 - B) compare adaptive characteristics of various species
 - C) identify the kinds of species that lived in the past and compare them to existing species

Stage 2: Assessment Evidence

Performance Task:

- The local zoo has an opening for one more very unique animal. However, the space they have provided has already been constructed with a ready-made environment. Given the environment provided, create a unique animal that would thrive. You need to give a visual representation of your animal and a written description of why its adaptations would help it to flourish in this environment.
- You are a group of genetic scientists. You all have been asked to bring back an extinct or endangered plant in order to turn it into an organism that thrives- look at things that may have been going on in the environment that led to endangerment or extinction (deforestation, pollution, overpopulation of predators, etc). Then think about what adaptations would be needed to help this plant thrive in its original environment. Using this information, create your “new and improved” organism and write a description of the adaptations you have chosen and why (adaptations must be realistic). You should also include future threats to or potential weaknesses you see in your plant, which may make it necessary for it to continue adapting. (ex: St. Helena Olive Tree:
http://www.arkive.org/species/GES/plants_and_algae/Nesiota_elliptica/more_info.html)

Other evidence:

(quizzes, tests, academic prompts, etc.

note – these are usually included where appropriate in Stage 3 as well)

- Vocabulary Quiz: Adaptations, camouflage, mimicry, environment, shelter, climate, hibernation, migration, taproot, fibrous root, photosynthesis, carbon dioxide.
- Organizer that compares how two different animal species have adapted to meet their needs.
- Venn Diagram to compare an extinct species to a similar existing species (e.g. woolly mammoth vs. an elephant)
- Organizer that compares plant species.
- Academic prompt: “Would I like it here?” Students will take on the viewpoint of a plant or animal from one environment who visits another. Students will discuss why they did/did not fit in to this new environment.

Stage 3: Learning Activities

(Steps taken to get students to answer Stage 1 questions and complete performance task)

Day 1: Show a PowerPoint slide of plants and animals that are both extinct and endangered and some that currently exist. Ask students to guess the name of the PowerPoint based on the different types of organisms they have seen. Once students have figured out that some of these animals are extinct, endangered and surviving, use a 'science talk' to introduce the first question "Why have some organisms become extinct or endangered and other have not?" Have students discuss this question together (little teacher intervention) while the teacher is taking notes on what students understand about adaptations, how they make sense of the process, and what questions they have.

Day 2: Go over with students the vocabulary needed for this unit: "Adaptations, camouflage, mimicry, environment, shelter, climate, hibernation, migration, taproot, fibrous root, photosynthesis, carbon dioxide." Have students create a vocabulary flip book. This book should include both pictures and words to define the key terms. Encourage students to keep this flip book so that they may add things to it as we go through the unit. (Quiz will be on day 4, so remind students to study).

Day 3: Read Chapter 2: Lesson 1 in the book "What are the basic needs of animals" (pg. A32-37). Discuss with students how different animals have adaptations that help them meet these different needs. (ex. Frogs have sticky, long tongues to catch food, fish can convert water into oxygen using their gills, etc.)

Day 4: Give students the **vocabulary quiz**. Then, read a portion of the chapter 3 Lesson 1 "What do Plants need to live?" (pgs. A64-A65) Discuss with students the different needs of plants and animals.

Ask students:

- What would happen if a species couldn't meet its needs?
- What are some of the challenges that may face a species in its environment?
- Do you think organisms are still adapting?

Introduce the template of the chart students will use to compare how two different species have adapted to meet their needs. (For both plants and animals)

Day 5: Have students do a quick write (10 minutes) discussing how they change their appearance and actions in different settings. (Spurs game, church, school, DYSA field). Have students share their ideas. Then Introduce the 2nd essential question: "How does a particular environment affect the way a species looks or acts?"

Day 6: Read Chapter 2 Lesson 2: "How do Animals' Body Parts Help Them Meet Their Needs?" (pgs. A39-A45). Discuss with students the ways that an animal's body can adapt to its environment to help it meet its needs. Also, read lesson 3 "How do animals' behaviors help them meet their needs?" (pg. A48-A53).

Day 7: Pass out information on a specific animal (ex. Humpback Whale:

<http://www.acsonline.org/factpack/humpback.htm>) Fill out one side of the comparison template/organizer as a class.

Day 8: Pass out information to students on another animal (ex. Orca whale:

http://www.thebigzoo.com/Animals/Killer_Whole.asp) and have students independently fill in the second part of the **animal comparison organizer**.

Day 9: Read Chpt. 3 Lesson 2: "How do leaves, stems, and roots help plants live?" (pgs. A70-A73) and a portion of Chapter 3 Lesson 3: "How do plants Reproduce?" (pg A77). Discuss the different ways a plant's "body" can adapt to help it meet its needs.

Day 10: Plant Comparison: Provide students with information on 2 plants one extinct/one not. (Cactus:

<http://en.wikipedia.org/wiki/Cactus> St. Helena Olive Tree:

http://www.arkive.org/species/GES/plants_and_algae/Nesiota_elliptica/more_info.html) Then have students complete the plant comparison organizer. Have students answer the question: "How did the cactus adapt to survive?" "Why didn't the St. Helena Olive Tree survive?"

Day 11: Academic prompt: "Would I like it here?" Students will take on the viewpoint of a plant or animal from one environment who visits another. Students will discuss why they did/did not fit in to this new environment.

Day 12 and 13: Performance Task #1: The local zoo has an opening for one more very unique animal. However, the space they have provided has already been constructed with a ready-made environment. Given the environment provided, create a unique animal that would thrive. You need to give a visual representation of your animal and a written description of why its adaptations would help it to flourish in this environment.

Day 14: Pass out information to students on one extinct animal and a surviving animal. Students should read this material. Have students use a **Venn Diagram** to compare these two species (Ex. American Crow:

<http://www.birds.cornell.edu/bow/amecro/> vs. a dodo bird: <http://www.birds.mu/Extinct/Dodo.htm>). Ask students to discuss reasons why one survived and one did not.

Day 15: Revisit the essential questions "How does a particular environment affect how a species looks or

acts?” and “Why have some organisms become endangered or extinct and others have not?” Now that students have explored different adaptations, understood basic needs, and looked at certain challenges facing a species they will be better able to explore these questions.

Day 16 and 17: Read students the articles *Seed search finds vanished plants*

<http://news.bbc.c.uk/1/hi/sci/tech/1330521.stm> and ‘*Extinct*’ *Plants Revived from Seeds*

<http://www.abc.net.au/news/newsitems/200502/s1307750.htm> . These articles discuss what scientists are doing to bring back endangered/extinct species of plants. Then give the students their **second performance task**: You are a group of genetic scientists. You all have been asked to bring back an extinct or endangered plant in order to turn it into an organism that thrives- look at things that may have been going on in the environment that led to endangerment or extinction (deforestation, pollution, overpopulation of predators, etc). Then think about what adaptations would be needed to help this plant thrive in its original environment. Using this information, create your “new and improved” organism and write a description of the adaptations you have chosen and why (adaptations must be realistic). You should also include future threats to or potential weaknesses you see in your plant, which may make it necessary for it to continue adapting. (You may want to use the St. Helena Olive Tree that your students worked with before or find another plant for this project.)

Day 18: Take a nature walk with students to look at different plants or animals around the school. Discuss adaptations. “Why do these organisms look the way they do?”

Vocabulary Quiz

Use the words in the word box to match the vocabulary word with its definition.

Definitions

1. _____ One main root that goes deep into the soil.
2. _____ The average temperature and rainfall of an area over many years.
3. _____ Everything that surrounds and affects a plant or animal, including living and nonliving things.
4. _____ A root system that has many roots of the same size. The roots can grow long, but not deep.
5. _____ The process a plant goes through to make its own food.
6. _____ A place where an animal is protected from other animals or from the weather.
7. _____ The air that an animal breathes out and a plant “breathes” in.
8. _____ The movement of a group of one type of animal from one region to another and back again.
9. _____ An animal’s color or pattern that helps it blend in with its surroundings.
10. _____ A period when an animal goes into a long, deep “sleep”.
11. _____ An adaptation in which an animal looks very much like another animal or an object.
12. _____ A body part or behavior that helps a living organism meet its needs in its environment.

Word Box

- a. Adaptations
- b. Camouflage
- c. Mimicry
- d. Taproot
- e. Fibrous Root
- f. Climate
- g. Shelter
- h. Environment
- i. Hibernation
- j. Migration
- k. Carbon Dioxide
- l. Photosynthesis

Animal Comparison

Use the following chart to compare two different species. Discuss the specific adaptations that each species has that help it meet its basic needs.

Basic Needs	Species 1:	Species 2:
Climate		
Oxygen		
Food		
Water		
Shelter		
Reproduction (caring for young)		

Do you notice any similar adaptations?

Plant Comparisons

Use the following chart to compare two species of plants. In the boxes, describe how each of these plants meets its needs. Do they have specific adaptations that help them?

Basic Needs	Species 1	Species 2:
Light		
Air		
Water		
Nutrients		
Reproduction		
Natural Defenses		

Remember: Look at all aspects of the plant including leaves, stems, roots, seeds, etc.

Would I like it here?

Take on the viewpoint of a plant or animal from one environment who visits another. (Ex. An elephant in Canada, a tiger in the desert, a cactus in the rain forest etc.) Discuss why you did/did not fit in to this new environment. If you didn't fit, what would you have needed to fit in? If you did, what specific adaptations helped you out?

[illegible]

Options for the Zoo Environment

The local zoo has an opening for one more very unique animal. However, the space they have provided has already been constructed with a ready-made environment. Given the environment provided, create a unique animal that would thrive. You need to give a visual representation of your animal and a written description of why its adaptations would help it to flourish in this environment. Choose one of the following environments:

Environment #1: This environment is very dry. It does not rain very much and therefore has very little plants (vegetation). The only vegetation that can seem to grow here is cacti or yucca plants. The land is mostly filled with sand, and it is very flat.

Environment #2: This environment is very cold. The temperature is below freezing for most of the year, and there is a lot of permanent ice covering the ground. There are no plants growing and the unfrozen water near-freezing.

Environment #3: This environment is about 80 degrees every day. It is very humid here, and it rains all of the time. There are many different types of plants. There are both very tall trees and plants that grow close to the ground.

Remember: Think about **all** of the adaptations an animal may have like its body parts, teeth, body coverings, camouflage, mimicry, etc. Be prepared to justify your decisions.

Performance Assessment #1: Create an Animal Rubric

	Unacceptable 1	Approaching 2	Meeting 3	Exceeding 4
Adaptations (40 points)	The animal is inappropriately or not adapted at all to the environment.	You have included 1-2 appropriate adaptations.	You have included 3 appropriate adaptations.	You have given your animal more than 3 appropriate adaptations.
Justification of Adaptations (Written Description) (25 points)	There are is no justification for your adaptations OR Your justification is not reasonable considering your adaptations.	You have given a justification of your adaptations, but the justification is not exactly clear.	You have given accurate information on why your adaptations will help this animal flourish.	The information you have given on why your adaptations will help this animal flourish is thoughtful, accurate and thorough.
Visual Representation (25 points)	You have not made a visual representation of your animal.	Your animal is shown, but not in the environment OR Your animal is missing some of the adaptations.	Your animal is shown in its environment illustrating all of your adaptations.	Your animal is shown in its environment, has all of its adaptations, and is presented creatively.
Grammar and Conventions (10 points)	There are so many errors in grammar or conventions that the reader cannot fully understand your explanation.	There are some errors in grammar or conventions, which make it difficult for the reader to understand.	There are few errors in grammar or conventions.	There are no errors in grammar or conventions.

Genetic Scientist Rubric

	Unacceptable 1	Approaching 2	Meeting 3	Exceeding 4
Adaptations	You have not made any adaptations to your plant.	You have made only 1 adaptation to your plant.	You have made 2 helpful adaptations to your plant to help it survive.	You have made more than 2 helpful adaptations for your plant.
Justified Adaptations	There were no logical reasons for your adaptations.	You have tried to adapt your plant, but it is unclear whether those adaptations will be helpful.	You have justified your adaptations logically, and it seems that these will help your plant survive.	You have clearly thought out your justification, and it is certain that these adaptations will help your plant thrive.
Future Fears	You have not considered any future threats to your plant.	You have considered appropriate future threats to your plant, but have not given any future adaptations.	You have considered future threats to your plant and have addressed those threats with a future adaptation.	You have considered future threats to your plant and have addressed those threats giving more than one option for future adaptation.
Grammar and Conventions	There are so many errors in grammar or conventions that the reader cannot fully understand your explanation.	There are some errors in grammar or conventions, which make it difficult for the reader to understand.	There are few errors in grammar or conventions.	There are no errors in grammar or conventions.